Multithreading Workshop Solutions

Copyright © James Raynard 2021

Loop

- Imagine the following function is executed concurrently by two threads

```
int x{0};

void func() {
    while (x == 0) {
        x = 1 - x;
    }
}
```

- Are there any possible scenarios in which neither thread is able to exit the loop? If so, how would you fix the problem?

Copyright © James Raynard 2021

Loop

- Possible scenario
  - Thread 1 tests x == 0. This is true because x has not been modified
  - Thread 2 tests x == 0. This is true because x has not been modified
  - Thread 1 sets x to 1 – x, giving 1
  - Thread 2 sets x to 1 – x, giving 0
  - Thread 1 tests x == 0. This is true
  - Thread 2 tests x == 0. This is true
  - Thread 1 sets x to 1 – x, giving 1
  - Thread 2 sets x to 1 – x, giving 0
  - …
- This is an example of "livelock". The program continues to execute, but makes no progress

Copyright © James Raynard 2021